

PATENT CLAIMS

1. Wearing parts system (1) intended for the tool of a tilling machine of the type which comprises a holder part (3), fixedly attached to the tool and comprising a front end part (8), and a wearing and/or replacement part (2), detachably arranged over this holder beak (8) and comprising a rear hollow (7), which is matched to the holder beak (8) of the holder part (3) and interacts therewith and which is designed to grip over the holder beak (8) and is fixed thereto by means of a detachable locking mechanism (5) comprising at least one locking device (27), placed through interacting openings (28A, 28B, 28C) made through the holder part (3) and the wearing and/or replacement part (2), the holder beak (8) and the hollow (7) of the wearing and/or replacement part (2) having contact zones (9, 22, 23), each comprising at least two mutually interacting contact faces (10, 25, 26), certain of which only interact with one another after a certain predetermined wear, which contact faces are disposed one on the holder part (3) and one on the wearing and/or replacement part (2) and are intended to absorb vertical, horizontal and collateral forces F_x , F_y and F_z , of which contact zones (9, 22, 23):
 - at least one pair of the front contact zones (9a, 9b) is disposed on either side of the longitudinal line of symmetry Y of the wearing parts system (1), whilst at least one pair of the rear contact zones (9c, 9d) forms a certain defined angle with and on either side of the said line Y;
 - at least one pair of the front and rear contact zones (9i, 9j and 9g, 9h) is disposed laterally offset in pairs and on either side of the line of symmetry Y;
 - and contact zones which comprise, on the one hand, at least one front contact zone (9e) and, on the other hand, at least two rear contact zones (9, 22, 23), two of which are constituted by interacting joints (22, 23) with common rotational axis Z, which joints (22, 23)

each comprise a recess (21) and a projection (19) each comprising a respective contact face (25, 26), disposed one on each coupling part (2, 3),

5 characterized in that the common rotational axis Z is arranged essentially perpendicular to the direction of fitting of the locking device (27), in that the said recesses (21) are made on the wearing and/or replacement part (2) and such that they comprise a respective end face (25), in that the projections (19)

10 are disposed on the holder part (3) and such that they comprise a respective end face (26), which contact faces (25, 26) are designed to interact so as, on the one hand, to limit the pushing-on of the wearing and/or replacement part (2) over the holder part (3) and, on

15 the other hand, to ensure that the contact between the contact faces (25, 26) will be made, primarily, at the common centre M_0 of the said end faces (25, 26) and secondarily, as the wear has progressed, symmetrically about this mid contact point M_0 as an increasingly

20 large contact zone (22', 23').

2. Wearing parts system (1) according to Claim 1, characterized in that the locking device (27) and the openings (28A, 28B, 28C) in the wearing and/or replacement part (2) and the holder part (3) are divided into at least three different sections (29A, 29B, 29C and 28A, 28B, 28C) in the longitudinal direction of the openings (28A, 28B, 28C), in which the section (28A) of the locking device opening which

25 appears first in the direction of fitting of the locking device (27) has the widest cross section (28A), whilst the third section (28C) of the locking device opening which appears last in the direction of fitting of the locking device (27) has the smallest cross-

30 sectional section (28C) and the first introduced, third section (29C) of the locking device (27) has the smallest cross-sectional section (29C), whilst the second locking device section (29B) in the direction of fitting has a somewhat larger cross section (29B) than

35

- 47 -

the first introduced, third section (29C) of the locking device (27), but, at the same time, somewhat smaller than the section (28B) of the said second locking device opening, and in that the last 5 introduced, first section (29A) of the locking device (27) has the widest cross section (29A) of the locking device (27).

3. Wearing parts system (1) according to Claim 1 or 10 2, characterized in that the locking device (27) is of the type which comprises a rigid locking device body (29) having an elastic material (32) inlaid into the locking device body (29), which material loads at least one movable engagement part (30, 31) toward a 15 predetermined position.

4. Wearing parts system (1) according to any one of 20 Claims 1 to 3, characterized in that the locking device (27) comprises at least two movable engagement parts (30, 31) loaded by elastic material (32), which engagement parts are constituted by a securing plate (31) for detachable blocking of the locking device (27) in a predetermined locking position, and a compression plate (30), which, via its elastic material (32), is 25 designed to load the contact zones (9, 22, 23) of the wearing and/or replacement part (2) and of the holder part (3) one against the other.

5. Wearing parts system (1) according to any one of 30 Claims 1 to 4, characterized in that the locking device (27) comprises a hollow (43) for the elastic material (32), which hollow (43) has a first gap opening (43) intended for the expansion of the elastic material (32) when this is subjected to load during the removal of 35 the locking device (27), and, in addition thereto, one or more further gap openings (41, 42, 43) through which the particular engagement parts (30, 31), in a state which for the locking device (27) is free from external

loads, project a certain way beyond the body (29) of the locking device (27).

6. Wearing parts system (1) according to any one of the preceding claims, characterized in that the locking device opening (28B) through the beak (8) of the holder part (3) comprises a first portion (35, 37) in the direction of fitting which is at least wider in a first direction than a corresponding portion (29B') of the body (29) of the fitted locking device (27), which portion (35, 37) of the locking device opening (28B) comprises a first segment (35) and a second segment (37), which first segment (35), which is wider than the corresponding locking device body (29) in the said first direction, is designed to constitute a cavity (35) intended for the securing plate (31) in its extended position blocking the locking device (27), whilst the second segment (37) is designed to constitute, or form, a space (40) intended for the expansion of the elastically deformable resilient material (32) when this is subjected to load during the removal of the locking device (27).

7. Wearing parts system (1) according to any one of the preceding claims, characterized in that connecting to the locking device opening (28A) through the hood (6) of the tine part (2) there is a pin (45) disposed on the inner side of the roof (36) of the hood (6), against which pin (45) the securing plate (31) of the locking device (27) shall fix.

8. Wearing parts system (1) according to Claim 7, characterized in that a bevel (46), which widens downward in the direction of fitting of the locking device (27), is disposed on that side of the locking device body (29) facing toward the said pin (45), so that the locking device body (29) and the pin (45) are free from contact with each other.

- 49 -

9. Wearing parts system (1) according to any one of the preceding claims, characterized in that a cross section through the body (29) of the fitted locking device (27) level with the inner side of the roof (36) of the hood (6) consists of a homogeneous, solid, unbroken cross section or a cross section which is unbroken to the extent of at least 50% or more.

10. Wearing parts system (1) according to any one of the preceding claims, characterized in that the leverage ratio from the Y-line of symmetry to the contact point M_0 between the hood (6) of the tine part (2) and the holder part (3) is equal to zero or less than the radius R_2 of the projection (19).

15 11. Wearing parts system (1) according to any one of the preceding claims, characterized in that the distance between the end faces (25, 26) of the collateral joints (22, 23) at their common centre M_0 is 20 equal to zero or substantially less than between the end faces (17, 18) of the collars.

12. Wearing parts system (1) according to either of Claims 10-11, characterized in that the radius R_1 for a 25 respective recess (21) is larger than the radius R_2 for a corresponding projection (19).

13. Wearing parts system (1) according to any one of the preceding claims, characterized in that at least 30 two rear contact zones (9) are provided, which comprise a greater angle of inclination to the Y-line of symmetry of an inner, longitudinal peripheral line P_i along the locking device opening (28B) through the beak (8) than of an outer, collateral longitudinal peripheral line P_{ii} .

35 14. Wearing parts system (1) according to any one of the preceding claims, characterized in that the various contact faces (10, 11, 25, 26) comprise a plurality of

- 50 -

different inclinations, conicities and roundings, several being parallel but laterally offset.

15. Wearing parts system (1) according to any one of
5 the preceding claims, characterized in that the torque
loads caused by the rotation of the wearing and/or
replacement part (2) in relation to the holder part (3)
are designed to be absorbed directly or after a certain
minor wear by at least one of the front contact zones
10 (9) in interaction with at least the said contact zones
(25, 26) on the rear collateral joints (22, 23).

AMENDED CLAIMS

Received by the International Bureau 04 May 2004 (04.05.2004);
Original claims 1-15 replaced by amended claims 1-15.

1. Wearing parts system (1) intended for the tool of a tilling machine of the type which comprises a holder part (3), attached to the tool and comprising a holder beak (8), and a wearing and/or replacement part (2), arranged at this holder beak (8) and comprising a hollow (7), which is designed to grip the holder beak (8) and is fixed thereto by means of a locking mechanism (5) through the holder part (3) and the wearing and/or replacement part (2), the holder beak (8) and the hollow (7) of the wearing and/or replacement part (2) having contact zones (9, 22, 23), each comprising at least two mutually interacting contact faces (10, 25, 26), certain of which only interact with one another after a certain predetermined wear, which contact faces are disposed one on the holder part (3) and one on the wearing and/or replacement part (2) and are intended to absorb forces F_x , F_y and F_z , of which contact zones (9, 22, 23):
 - at least one pair of the front contact zones (9a, 9b) is disposed on either side of the longitudinal line of symmetry Y of the wearing parts system (1), whilst at least one pair of the rear contact zones (9c, 9d) forms a certain defined angle with and on either side of the said line Y;
 - at least one pair of the front and rear contact zones (9i, 9j and 9g, 9h) is disposed laterally offset in pairs and on either side of the line of symmetry Y;
 - and contact zones which comprise, on the one hand, at least one front contact zone (9e) and, on the other hand, at least two rear contact zones (9, 22, 23), two of which are constituted by interacting joints (22, 23) with common rotational axis Z, which joints (22, 23) each comprise a recess (21) and a projection (19) each comprising a respective contact face (25, 26), disposed one on each coupling part (2, 3),

characterized in that the said recesses (21) comprise a respective end face (25) and in that the projections (19) comprise a respective end face (26), which faces (25, 26) are designed to interact so as, on the one hand, to limit the pushing-on of the wearing and/or replacement part (2) over the holder part (3) and, on the other hand, to ensure that the contact between the contact faces (25, 26) will be made, primarily, at the common centre M_0 of the said end faces (25, 26) and secondarily, as the wear has progressed, about this mid contact point M_0 as an increasingly large contact zone (22', 23').

2. Wearing parts system (1) according to Claim 1,
15 characterized in that the locking mechanism (5) comprises at least one locking device (27), placed through interacting openings (28A, 28B, 28C) through the holder part (3) and the wearing and/or replacement part (2), and that the locking device (27) and the
20 openings (28A, 28B, 28C) in the wearing and/or replacement part (2) and the holder part (3) are divided into at least three different sections (29A, 29B, 29C and 28A, 28B, 28C) in the longitudinal direction of the openings (28A, 28B, 28C), in which the
25 section (28A) of the locking device opening which appears first in the direction of fitting of the locking device (27) has the widest cross section (28A), whilst the third section (28C) of the locking device opening which appears last in the direction of fitting of the locking device (27) has the smallest cross-sectional section (28C) and the first introduced, third section (29C) of the locking device (27) has the smallest cross-sectional section (29C), whilst the
30 second locking device section (29B) in the direction of fitting has a somewhat larger cross section (29B) than the first introduced, third section (29C) of the locking device (27), but, at the same time, somewhat
35

smaller than the section (28B) of the said second locking device opening, and in that the last introduced, first section (29A) of the locking device (27) has the widest cross section (29A) of the locking device (27).

3. Wearing parts system (1) according to Claim 2, characterized in that the locking device (27) is of the type which comprises a rigid locking device body (29) having an elastic material (32) inlaid into the locking device body (29), which material loads at least one movable engagement part (30, 31) toward a predetermined position.

15 4. Wearing parts system (1) according to any one of Claims 2 to 3, characterized in that the locking device (27) comprises at least two movable engagement parts (30, 31) loaded by elastic material (32), which engagement parts are constituted by a securing plate 20 (31) for detachable blocking of the locking device (27) in a predetermined locking position, and a compression plate (30), which, via its elastic material (32), is designed to load the contact zones (9, 22, 23) of the wearing and/or replacement part (2) and of the holder 25 part (3) one against the other.

5. Wearing parts system (1) according to any one of Claims 2 to 4, characterized in that the locking device (27) comprises a hollow (43) for the elastic material (32), which hollow (43) has a first gap opening (43) intended for the expansion of the elastic material (32) when this is subjected to load during the removal of the locking device (27), and, in addition thereto, one or more further gap openings (41, 42, 43) through which 30 the particular engagement parts (30, 31), in a state 35 which for the locking device (27) is free from external

loads, project a certain way beyond the body (29) of the locking device (27).

6. Wearing parts system (1) according to any one of 5 the claims 2-5, characterized in that the locking device opening (28B) through the beak (8) of the holder part (3) comprises a first portion (35, 37) in the direction of fitting which is at least wider in a first direction than a corresponding portion (29B') of the 10 body (29) of the fitted locking device (27), which portion (35, 37) of the locking device opening (28B) comprises a first segment (35) and a second segment (37), which first segment (35), which is wider than the corresponding locking device body (29) in the said 15 first direction, is designed to constitute a cavity (35) intended for the securing plate (31) in its extended position blocking the locking device (27), whilst the second segment (37) is designed to constitute, or form, a space (40) intended for the 20 expansion of the elastically deformable resilient material (32) when this is subjected to load during the removal of the locking device (27).

7. Wearing parts system (1) according to any one of 25 the claims 2-6, characterized in that connecting to the locking device opening (28A) through the hood (6) of the tine part (2) there is a pin (45) disposed on the inner side of the roof (36) of the hood (6), against which pin (45) the securing plate (31) of the locking 30 device (27) shall fix.

8. Wearing parts system (1) according to Claim 7, characterized in that a bevel (46), which widens downward in the direction of fitting of the locking 35 device (27), is disposed on that side of the locking device body (29) facing toward the said pin (45), so

that the locking device body (29) and the pin (45) are free from contact with each other.

9. Wearing parts system (1) according to any one of
5 the claims 2-8, characterized in that a cross section
through the body (29) of the fitted locking device (27)
level with the inner side of the roof (36) of the hood
(6) consists of a homogeneous, solid, unbroken cross
section or a cross section which is unbroken to the
10 extent of at least 50% or more.

10. Wearing parts system (1) according to any one of
the preceding claims, characterized in that a leverage
ratio from the Y-line of symmetry to the contact point
15 M_0 between the hood (6) of the tine part (2) and the
holder part (3) is equal to zero or less than the
radius R_2 of the projection (19).

11. Wearing parts system (1) according to any one of
20 the preceding claims, characterized in that the
distance between the end faces (25, 26) of the
collateral joints (22, 23) at their common centre M_0 is
equal to zero or substantially less than between collar
end faces (17, 18) of the wearing and/or replacement
25 part (2) and the holder part (3).

12. Wearing parts system (1) according to either of
Claims 10-11, characterized in that the radius R_1 for a
respective recess (21) is larger than the radius R_2 for
30 a corresponding projection (19).

13. Wearing parts system (1) according to any one of
the claims 2-12, characterized in that at least two
35 rear contact zones (9) are provided, which comprise a
greater angle of inclination to the Y-line of symmetry
of an inner, longitudinal peripheral line P_1 along the
locking device opening (28B) through the beak (8) than

of an outer, collateral longitudinal peripheral line P_{ii}.

14. Wearing parts system (1) according to any one of
5 the preceding claims, characterized in that the various
contact faces (10, 11, 25, 26) comprise a plurality of
different inclinations, conicities and roundings,
several being parallel but laterally offset.

10 15. Wearing parts system (1) according to any one of
the preceding claims, characterized in that torque
loads caused by the rotation of the wearing and/or
replacement part (2) in relation to the holder part (3)
are designed to be absorbed directly or after a certain
15 minor wear by at least one of the front contact zones
(9) in interaction with at least the said contact zones
(25, 26) on the rear collateral joints (22, 23).